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ABSTRACT

The multimedia workstation described here serves as an information resource center for teachers and others who are responsible for the education of children from ethnically and linguistically diverse backgrounds. The changing nature of student populations requires that all teachers become knowledgeable about the diverse cultural backgrounds of their students and develop the necessary instructional skills and knowledge that promote students' continuing academic progress at the same time they are acquiring English as a new language. Using a technology-based workstation to accomplish this goal is promising because it allows individual teachers to structure their inquiries and training to fit their existing levels of instructional expertness. In addition, information and training about linguistically and culturally diverse student populations can be made accessible throughout wide geographic areas. The purpose of this paper is to delineate potential professional development areas that can be included in the workstation database. To assist in this process, interviews were conducted with teacher development personnel at universities and intermediate and local education agencies where technology-supported teacher development efforts are underway. These uses were mapped with the requirements for effective instruction of diverse student populations as reported in the literature and applied in California's (Bilingual) Cross-cultural, Language, and Academic Development (CLAD/BCLAD) credentials. Interview findings and a preliminary schema for design of the workstation database are included in this report. (Contains 13 references.) (Author/ND)

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Southwest Regional Laboratory

October 1995

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Design Elements for Teacher Professional Development Workstation: Application of Technology To Develop Expert Teachers of Diverse Student Populations

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Southwest Regional Laboratory

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The Southwest Regional Laboratory (SWRL) is a nonprofit, public educational agency that exists to address challenges resulting from changing demographics and increasing numbers of children placed at risk in the Metropolitan Pacific Southwest. The Laboratory addresses its mission by engaging in research, development, evaluation, training, technical assistance, and policy analysis.

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ABSTRACT

The Southwest Regional Laboratory's (SWRL's) Metropolitan Educational Trends and Research Outcomes (METRO) Center has been developing a multimedia workstation for multicultural education. The workstation serves as an information resource center for teachers and others who are responsible for the education of children from ethnically and linguistically diverse backgrounds.

The proportion of the student population from homes in which parents are immigrants to the United States continues to increase in California and other border states, and is growing in inland states as well. The changing nature of student populations requires that all teachers become knowledgeable about the diverse cultural backgrounds of their students and develop the necessary instructional skills and knowledge that promote students' continuing academic progress at the same time they are acquiring English as a new language. To provide professional development of this sort to all teachers is a large undertaking. Using a technology-based workstation to accomplish this goal is promising because it allows individual teachers to structure their inquiries and training to fit their existing levels of instructional expertness. In addition, information and training about linguistically and culturally diverse student populations can be made accessible throughout wide geographic areas.

The purpose sf this paper is to delineate potential professional development areas that can be included in the workstation database. To assist in this process, interviews were conducted with teacher development personnel at universities and intermediate and local education agencies where technology-supported teacher development efforts are underway. These uses were mapped with the requirements for effective instruction of diverse student populations as reported in the literature and applied in California's (Bilingual) Cross-cultural, Language, and Academic Development (CLAD/BCLAD) credentials. Interview findings and a preliminary schema for design of the workstation database follow in this report.

Introduction

The Southwest Regional Laboratory's (SWRL's) Metropolitan Educational Trends and Research Outcomes (METRO) Center has been developing a multimedia workstation for multicultural education. The workstation serves as an information resource center for teachers and others who are responsible for the education of children from ethnically and linguistically diverse backgrounds. It uses computer and laser-disk technology to bring together cultural, social, instructional, and strategic information in an attractive and user friendly format to access a core database of resources. Menus permit users to create their own paths or to select prespecified paths through filmed, audio, and written information.

Two major objectives have guided conceptualization of the workstation. Provided first are learning methods and environments required for culturally and linguistically diverse students to most effectively (a) develop English language proficiency, (b) succeed in academic content areas, (c) allow for a smooth transition to the new cultural environment, and (d) create a safer, more comfortable environment for home and school interactions. Also provided are opportunities to examine instructional approaches in a context that is most similar to the real world through dynamic learning models integrating (a) motion picture display; (b) audio information; (c) integration of audiovisual components to maximize clarification of each situation through a variety of modalities; (d) text, both when appropriate and as documentary supplements to content under consideration; and (e) interviews with prominent researchers and practitioners.

The proportion of the student population from homes in which parents are immigrants to the United States continues to increase in California and other border states, and is growing in inland states as well. For example, in the 1993-94 school year, over 50% of the students in grades K-12 in California's public schools came from language minority backgrounds, of whom 22.3% were limited English proficient (LEP). Nine out of 10 California schools served student populations that included LEP students. As early as the 1990-91 school year, a typical class in a sample of 1,422 beginning teachers assigned to teach in urban, suburban, and rural schools throughout California included students among whom three minority backgrounds were represented, with 25% of the students being LEP. No class was comprised entirely of native-born students proficient in English (Ward, Dianda, & van Broekhuizen 1992). The most recent data available for Arizona show that, during the 1992-93 school year, 12.2% of students were LEP. Nevada had proportionally fewer students from minority backgrounds, but even there, during the 1993-94 school year, 7.9% of the students were LEP.

The changing nature of student populations requires that all teachers become knowledgeable about the diverse cultural backgrounds of their students and develop the necessary instructional skills and knowledge that promote students' continuing academic progress at the same time they are acquiring English as a new language. To provide professional development of this sort to all teachers is a large undertaking. Using a technology-based workstation to accomplish this goal is promising because it allows individual teachers to structure their inquiries and training to fit their existing levels of instructional expertness. In addition, information and training about linguistically and culturally diverse student populations can be made accessible throughout wide geographic areas.

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Uses of Technology in Teacher Professional Development

Interviews that were conducted focused on how technology can be used to improve teachers' pedagogical skills, knowledge, and understandings, not on training teachers to use this technology to instruct students.

Electronic technology, such as telephones, voice-mail and answering machines, audio recorders, video recorders and monitors, computers, video laserdiscs, CD ROM discs, and electronic information transfer systems accessed through computers, can be applied in educational professional development efforts. Although Brooks and Kopp (1989) reported that application of these technologies to teacher education was behind schedule compared with their use in other professional fields, each year needed improvements in school building infrastructures and purchase of necessary equipment are making technology more accessible at school sites. Even so, Scott (1993) estimated that 75% of the nation's schools are of an age that suggests they lack the electronic wiring needed to support multiple pieces of technological equipment, to link computers throughout a school with one another, or to provide external access to computer networks. Nevertheless, the number of schools and other education agencies able to access technology-supported professional development is rapidly becoming large enough to warrant concerted attention to developing a database to support this effort.

The professional development purposes for which technology can be used include:

- obtaining, sharing, and responding to information about pedagogy (e.g. instruction, curriculum, student learning);
- demonstrating instructional knowledge, skills, and concepts; and
- analyzing an instructional situation, acting upon this analysis, and observing the consequences of the action.

In a professional development workstation, these purposes can be brought together in ways that both provide individual teachers access to pertinent professional knowledge and skills, and support discussion among teachers, researchers, staff developers, curriculum developers, and other interested persons across wide geographic areas. Examples follow.

Obtaining, Sharing, and Responding to Information about Pedagogy

Access to new information and insights is an essential part of professional growth and development at all stages of a teaching career. Ready access to practical information such as schedules for major conferences encourages teachers' continuing engagement in professional growth activities. Availability of other teachers' lesson plans, materials, and assessment tools for specific instructional units expands teachers' repertoires of instructional approaches. Recent professional literature in fields such as psychology, sociology, instructional methodology, and curriculum provides new insights about effective instruction of students from various linguistic and cultural backgrounds. Teacher, researcher, and other professional educator responses to specific questions or as part of open discussions of instructional challenges increase teachers' ability to assess the effectiveness of their instruction and to modify instructional content and procedures accordingly to improve students' learning.

For years, many teachers have gained access to this sort of information without the use of technology. Schedules and messages have been distributed through written notes and memos via school district mail systems or through U.S. mail. Current professional literature has been obtained through school district, university, or public libraries; by subscribing to professional journals; and by purchasing professional books. Teachers have duplicated lesson plans and other materials for one another, and school district curriculum developers have made lesson sample plans and materials available. Workshops or seminars have provided opportunities for exchanges of ideas among teachers.

As illustrated in the following examples, using technology to support educational professional development can make information accessible to all teachers at their convenience

and can broaden the range of individuals who provide and respond to information about instruction.

Dispensing and obtaining information. The most common sorts of information about professional development needed by teachers are notices of professional development activities; reminders of information and materials to be brought to a workshop, seminar, or meeting; verifying their interest in a professional development activity; or exchanging information regarding instructional plans and curriculum materials.

At the simplest level, this sort of information traditionally has been communicated in print and distributed through a school district's mail service or by U.S. mail. The advent of inexpensive telephone voice-mail systems provides another way this kind of information can be disseminated. Messages may be left while teachers are teaching. They may check their messages at various points during the day, providing them with up-to-the minute information about various topics. If an answering machine is used that includes mail boxes, each teacher's messages may be private, dealing only with the areas of professional development in which that teacher is interested.

When a computer and a modem are available, electronic linkage with an interactive network can be established and electronic mail (e-mail) can be used to distribute information. Teachers can use e-mail to complete forms to enroll in workshops, seminars, or courses; request additional information about particular professional development efforts; ask questions about professional development efforts or instructional plans and materials; and respond to questions and requests from others. Teachers with technological capability in their homes also use e-mail to access professional development information.

Currently, information dissemination via e-mail is used more frequently in preservice teacher education programs than experienced teacher professional development, largely because most universities have established computer networks through which persons can be linked. Professors who teach preservice teacher education courses communicate with students in the courses using the university electronic information network or by using the university network to access the Internet, a worldwide electronic computer network. Electronic sharing of information most often is used during the student teaching phase of preservice teacher training when students spend much of their time away from the university campus.

The California State University (CSU) system serves as an example. CSU operates an electronic information network (CSUnet) that supports electronic transfer of information. The network includes access points at all CSU campuses and some community colleges in the state. Persons at CSU campuses and other education-related agencies can obtain addresses on the network and use the CSU access points to obtain or send e-mail messages. At several CSU

campuses, persons in the teacher education program who are assigned to student teach at schools that have the necessary computer equipment and network linkages receive announcements and messages from their professors at their school sites via e-mail. Some also receive messages using their home computers and linkages. Professors use e-mail to schedule days to visit classes in which student teachers are teaching or to meet with their master teachers. Some class or seminar assignments also are distributed by e-mail. Student teachers likewise can leave e-mail messages and questions for professors. Course papers, reports, and other materials prepared on a computer by student teachers may be "turned in" by placing them in professors' e-mail files. Master teachers with whom student teachers are working communicate with professors in similar ways.

County offices of education, school districts, the California Department of Education (CDE), and the California Commission on Teacher Credentialing (CTC) also have access to CSUnet. Several county offices of education (e.g., Sacramento, Los Angeles, Santa Clara) serve as nodes—points through which users gain telephone linkage to CSUnet and through that to the Internet and have designated computers on which e-mail messages for local users are stored.

California's Beginning Teacher Support and Assessment (BTSA) Programs illustrate how the various agencies use this system. Directors of BTSA programs throughout California, many of which are located at county offices of education, and staff at CDE and CTC are linked via CSUnet. Using e-mail, participants are notified regarding statewide and regional program meetings and agendas. Program directors share information about teacher assessment strategies they are using and professional development support they are providing beginning teachers and the ways they work with experienced teacher coaches assigned to beginning teachers.

The BTSA Program in Sacramento County uses the county office of education node to link to CSUnet and to store e–mail messages for program participants. Beginning teachers assigned to schools with the necessary computer capability are linked to other beginning teachers in the program, the program director, professors at CSU Sacramento, who are working with the program, and experienced teacher coaches working with BTSA beginning teachers. To date, all beginning teachers in two of the eight participating districts are assigned to schools that are linked to CSUnet. Three additional districts will join the network during the current school year. Unfortunately, most beginning teachers in other program districts are assigned to older schools where the electronic wiring does not support linkage to the network. In the meantime, program participants with the necessary computer capabilities at their homes can access CSUnet and participate from there. Other beginning teachers receive messages via telephone or the U.S. mail.

Thus far, the primary use of the Sacramento beginning teacher network has been as an e-mail bulletin board. Messages are sent and received among beginning teachers, the project director, professors at CSU Sacramento, and experienced teachers who serve as beginning teacher coaches. Beginning teachers with access to the network are encouraged to ask questions related to their beginning teaching experiences. A question may prompt responses from other beginning teachers, the program director, CSU professors, and/or experienced teacher coaches.

Interactive communications. The above discussion alluded to use of electronic linkages not only for information dissemination purposes but also to afford teachers an opportunity to interact with others and ask questions about instruction, receive recommendations about ways to improve instruction, suggest curriculum units and materials to be used, discuss challenges posed by various students, and how to promote successful learning for these students. Such interactive communications may involve specific networks, like the Sacramento BTSA network, or be open to anyone who is interested. A major concern about such interactive communication is the quality of the information transmitted (Bull, Harris, Lloyd, & Short, 1989). In addition to referencing practical experience, attention to the professional knowledge base and outcomes of research on effective instruction is essential if the professional development integrity and validity of the networks is to be maintained. At the same time, dialogues that attend primarily to teachers' needs rather than to the specific interests of professors and other teacher trainers build teachers' interest in networking and promote the targeted value of the communications.

The National Education Association (NEA) School Renewal Network is an example of a well-developed interactive computer network. Beginning in the mid-1980s, NEA launched a Mastery in Learning Program in which teachers at participating schools are responsible for designing, implementing, and evaluating schoolwide education program improvements. Early on, IBM provided each school in the program a computer and the necessary support equipment and materials to link to SYNnet, an electronic communication system, and provided computer file servers for storing and retrieving communications among network members. Originally, communication among members was solely via SYNnet. For the past four years, the School Renewal Network has functioned independently of IBM. SYNnet now serves as a gateway to the Internet, which is used as the electronic highway for the Renewal Network. The Mastery in Learning Program supports two computers that store Renewal Network information.

In 1995, the network included 300 sites, most of which are schools engaged in renewal efforts. Transmission of information is rapid and can be sent to network members across the country or in other countries around the world as easily as to teachers at a school in

participants' own school districts. Network members can tap into dialogues/conferences that are taking place at any time, adding their comments to those of others.

A major use of the School Renewal Network is to ask questions about and obtain assistance in the areas of school restructuring, curriculum, parent involvement, teacher-directed action research, and instruction of at-risk students. An expert in each area coordinates conferencing around that topic. All members of the network may ask and provide information relative to all topics. Often, discussions continue over extended periods of time. In addition to providing their own insights and recommendations, as copyright laws allow, designated experts and others also may include copies of pertinent conference papers and other professional documents as part of their responses. These are brought into files on computers at various school sites and are available for downloading or printing for use by teachers and others at the sites.

Approximately 70% of the School Renewal Network users are teachers; the remaining 30% are researchers, developers, policymakers, and school district central office personnel. Teachers indicated the responses to their questions that were most helpful were those that, in turn, asked them whether they had thought about or looked at certain aspects of instruction or learning, student characteristics or actions, or curriculum materials. Long responses that included technically heavy input were seen as less useful.

Other networks are moving in similar directions. California Professional Development Consortia sites that carry out teacher development activities related to effective implementation of California's curriculum frameworks use e-mail to share training session plans and the teacher development programs they are developing. A consortia site in Northern California links teachers at 10 middle and high schools via a consortium folder on an Internet access service to share ideas regarding curriculum units in history, English/language arts, and math. California BTSA projects with the necessary technological support are setting up chat groups for beginning teachers and their experienced teacher coaches across participating school districts. Eventually, the goal is to have a statewide BTSA chat group.

Many university networks linking professors, student teachers, and master teachers are used for conferencing as well as for e-mail purposes. Two university-based conferencing networks that provided early examples of such use were the Harvard University Graduate School of Education network linking first-year teachers throughout the country who graduated from the Harvard program (Merseth, 1988) and the University of Virginia School of Education network to support preservice trainees during the student teaching process (Bull, Harris, Lloyd, & Short, 1989).

Other mechanisms used to support interactive communications are telecasts via satellite and desktop video conferencing. Most CSU campuses in California are licensed to use up-

and-down links to satellites for educational purposes and have studios at which telecasts can be sent and received. Equipment to receive the telecasts is located at distant points throughout a campus's service area. Some distant sites have the capability to both receive and send information via the satellite. The satellite system is used to include persons from a wide geographic area in CSU courses. Participants at distant points see and hear lectures and discussions that take place at the central studio (classroom). Depending on the satellite linkages, participants at distant sites may or may not be seen by persons at the central or other distant sites. However, using telephone linkages, persons at all sites may ask questions and contribute to the discussion. Generally, assignment of times when persons at each site ask questions and make comments facilitates participation across sites.

Other education agencies also use the facilities. For example, in summer 1995, the California Professional Development Consortia site serving 10 counties in Northern California conducted teacher development summer institutes via satellite, using satellite-linkage facilities at several CSU and community college campuses as places where teachers met for institute activities. This encouraged participation of teachers from distant rural areas who traveled to locations near their homes but would not have come to Sacramento to attend. A BTSA project in the same region has used the satellite facilities to involve beginning teachers from several counties in weekly professional development seminars.

Desktop video conferencing brings another important asset to interactive-communication technology. In addition to seeing and hearing participants, a wide variety of documents including manuscripts, drawings, and diagrams can be transmitted among them. As they interact, individuals at various sites may edit or add to documents. Changes appear as they are inserted, and discussion of modifications takes place as they are entered. At any point, documents can be printed out at any participating site. Computers with video cameras placed on the monitor support the two-way audio and video interaction. Locations are linked using digital telephone lines. Video images of participating individuals are shown on approximately one fourth of the monitor screen, and sound is transmitted through the computer's audio system. Persons from multiple sites can be linked, although only one site at a time will appear on the screen.

Use of this technology is new to education. One site is the Northwest Regional Educational Laboratory located in Portland, OR, now in the process of testing its use between laboratory program staff and school personnel in the state education agency and school sites in Alaska.

Obtaining documents related to teacher development. Electronic linkages also can be used to obtain copies of research reports and other literature related to effective teaching, and to

work with others to develop curricular and other instruction-related materials. For instance, using TENET, the Texas Education Electronic Network, teachers have access to e-mail, other networks including Internet, and educational materials resource banks and libraries throughout the state. Before designing lesson plans and units, teachers solicit ideas from teachers across the state and the nation, and check resource banks and libraries for supporting materials and information (Curtin et al., 1994).

Addition of the World Wide Web (WWW) to the Internet has increased electronic access to professional educational documents. Numerous educational agencies and publishers have entered "pages" on the WWW that give information about the agency and provide documents and other materials available from that agency. Using the same technological support described, a software program that provides entrance to the WWW from the Internet, and WWW addresses for various agencies, teachers and others can obtain a wide array of educational documents and materials.

SWRL's WWW serves as an example. Persons accessing the SWRL WWW obtain information about the educational research and development programs underway at SWRL and the SWRL professional staff. Research reports and other professional papers prepared by SWRL staff that are frequently requested by persons in the field are accessible through SWRL's WWW. Interested persons can copy these documents to files on their own computers and print out copies for their own use.

The list of educational agencies creating WWW pages is large. All regional educational laboratories and educational research and development centers in the country have, or soon will have, pages on the WWW. State departments of education throughout the country, and, in California, the county offices of education, likewise are creating WWW pages. They will make state and county educational publications available through the pages.

For some 20 years, the national Education Research Information Center (ERIC) clearinghouses have archived and made available printed copies of a wide range of educational research reports and professional articles that are in the public domain. Several ERIC clearinghouses have WWW pages. These include the centers on information and technology, assessment and evaluation, urban education, reading and English, and science, math, and environment. Although the documents available from each ERIC clearinghouse are far too many to include as part of a WWW site, teachers and other interested persons can obtain information about the catalog of materials at an ERIC clearinghouse. At times, key documents related to a topic of current interest may be included on the WWW.

Using the *America Online* (AOL) electronic information service, the Association for Supervision and Curriculum Development (ASCD) provides information to the Learning and Reference Department of AOL. ASCD offers articles and excerpts from the association's

professional journal, *Educational Leadership,* and association newsletters and handbooks. Information and contents are updated monthly. Other educational-related agencies that provide articles and information to the AOL reference department include the National Education Association, National Geographic Society, and the Smithsonian.

Other technological tools for making documents available to teachers and other educators are regular computer discs and CD-ROM discs containing copies of documents and materials. Providing documents in these formats makes larger quantities of information available to the user, particularly when CD-ROM format is used. The user can print, modify, and add to the information on the discs.

The Texas Association for Supervision and Curriculum Development has developed an Alternative Blueprint for Curriculum Development program that is CD-ROM based. The CD-ROM discs incorporate lesson plans, teacher's guides, charts, diagrams, student assessments, answer keys, and suggested resources and activities related to K-12 instruction in math, social studies, and language arts. Working at their computers, teachers may choose, edit, modify, reorganize, and add to lessons and materials to create their own units. Copies may be printed out for use with students. Teachers are encouraged to share their modifications and additions with the association. Annual updates of the CD-ROMs are available. Access is free to teachers whose districts become members of the project. This involves a first-year district fee and an annual maintenance fee, the latter of which is based on district size.

California's BTSA projects offer yet another example of technology-support document development. As part of the teacher assessment process, beginning teachers in the projects are required to maintain journals in which they comment on their teaching experiences, including descriptions of challenging and rewarding events that occur in their classes and their responses to these events. Periodically, the experienced teacher coaches with whom the beginning teachers work review the journals and enter comments and suggestions. At many project sites, the journal format is available on a computer disc. All journal entries may be entered on the computer, with discs containing up-to-date entries exchanged by the beginning teacher and his/her coach. This brings the convenience of word processing to the journal process, which, in turn, encourages inclusion of more extensive information and interaction between beginning teachers and coaches than occurs when entries and comments are handwritten.

Demonstrating Instructional Knowledge, Skills, and Concepts

Clearly, the primary technological vehicle for demonstrating use of pedagogical knowledge, skills, and concepts is videotape recordings. Video recorder technology is familiar and user-friendly. Costs are reasonable. Equipment is readily available in almost all schools.

Teacher development programs have utilized video-recorded examples of teachers' use of various instructional skills and strategies since the late 1960s. Two early efforts were in the form of protocols that illustrated instructional skills or concepts (Smith, Cohen, & Pearl, 1969) and minicourses emphasizing a small set of related instructional skills (Borg, Kelley, Langer, & Gall, 1972). Contrary to current use of videotaped examples that tend to emphasize naturally occurring classroom events, these early uses were more focused.

Protocols provided videotaped or filmed examples of behavioral situations that illustrated specific teacher behaviors as they occurred in real world settings. To ensure that key features of the behavior and situation were observable, the situations that were recorded often were precisely scripted. The purpose was to provide focused examples of teaching that could be examined at length using concepts from psychology, philosophy, sociology, etc., to interpret them. Generally, protocols were used in preservice teacher training courses with professors and teacher trainees viewing and examining the protocols together.

Minicourses were designed to be used by individual teachers or by a small group of teachers. Each minicourse was a self-contained package that focused on a particular aspect of teaching such as questioning and discussion techniques, development of students' language skills, teaching reading, and organizing independent, individualized learning opportunities for students. A course included videotaped examples of a number of precise teaching skills or competencies relevant to the instructional area of interest. A teacher handbook provided information about skills and competencies. It also included tools that could be used to analyze the performance of teachers in the videotaped examples. In addition to viewing and analyzing instructional examples, teachers taking a minicourse planned and taught minilessons in which they applied the instructional skills/competencies they had observed in the video examples. Teachers videotaped lessons they taught and used assessment forms, also provided in the teacher handbook, to evaluate their own use of the skills. These teaching-evaluation segments were referred to as microteaching.

Demonstration of teaching skills and knowledge generally continues to follow much the same processes today. The major modifications are in the breadth and depth of instructional skills and concepts included in the examples that are provided, more reliance on inclusion of demonstration examples as part of a workshop schema rather than as individualized training packages, and less use of microteaching follow-up activities.

Throughout the country, school districts and other educational services agencies such as the California county offices of education maintain libraries of professional development materials built around videotaped examples of effective instruction. Some are commercially produced, others are local products.

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Two of the video-based professional development resources produced by ASCD illustrate the types of commercial materials that are available. ASCD's Multiple Intelligences Video Series includes three videotapes, a facilitator's guide to be used by the person conducting professional development workshops based on the series, an audiotape recording of an expert on multiple intelligences talking about the theory, and an ASCD professional book summarizing research and literature in the area. One videotape focuses on understanding multiple intelligences theory. It includes lectures about the theory and shows teachers describing how to create classrooms that apply the theory. The second tape includes four segments, each of which shows students and teachers involved in instructional experiences based on the theory. Examples cover elementary through high school applications. In the third tape, experts on multiple intelligences and practitioners who are using the theory talk about how application of the theory supports school reform/improvement. The facilitator's guide provides suggested workshop outlines, handouts, overheads, and resource readings. ASCD's Multicultural Education Series includes a 40-minute videotape showing how to develop cultural awareness among students and teachers, incorporate multiculturalism into instruction and curriculum, ensure equal opportunities for all students to learn, and provide opportunities for community involvement. Presentations by experts in the area explain why a multicultural prospective is necessary. This series also includes a facilitator's guide and a professional book dealing with the topic.

Locally produced professional development packages are abundant and contain similar elements. Videotaped examples of key instructional concepts and strategies form the nucleus of the teacher training materials developed by California county offices of education bilingual education coordinators and the regional directors of the statewide Bilingual Teacher Training Programs (BTTP). Training materials focus on skills and knowledge related to effective instruction of bilingual classes and/or groups of students from diverse language and cultural backgrounds, some of whom are LEP. BTTP materials emphasize the skills and knowledge required to obtain CLAD/BCLAD credentials. Regional directors of the statewide professional development consortium produce training materials to support implementation of California's curriculum frameworks. Videotaped examples of classrooms in which instruction follows the guidelines of the framework are available for several academic subject areas. Working with BTSA project directors, the CDE has developed a program to build experienced teachers' skills as beginning teacher coaches. Videotaped examples of beginning teacher performance during various types of lessons and follow-up conferences between the coach and beginning teacher about the lessons serve an important role in the training.

Interestingly, both commercial and local developers have been slow to use CD-ROM or video laserdisc technology as vehicles for presenting examples of instructional skills and

concepts. This is largely due to the cost of producing materials using these technologies compared with the size of the market for their use. Limited availability of play-back equipment at educational sites is another reason for the delay. Instructional use of either technology has advantages over videotape. Both can be linked to a computer and thus to programs that facilitate ready movement among information on the discs based on teachers' input, decisions, or questions, something that is much more cumbersome on videotape. In addition, the storage capacity of a CD-ROM or laserdisc allows inclusion of extensive supporting written materials, observation forms, etc., that can be printed out for use by teachers.

SWRL's survey of professional teacher development efforts found no sites where teacher development packages were being prepared using the CD-ROM format as the primary vehicle for delivery of the training, although several persons saw advantages to using the technology. For example, a BTTP director suggested it would be helpful if CD-ROM discs were available to preservice and in-service teachers that included practice tests and supporting literature, instructional examples, and other materials related to each of the six examinations that teachers in California must pass to qualify for CLAD/BCLAD credentials to teach student populations that include LEP students.

Recently, Indiana University and the North Central Regional Educational Laboratory (NCREL) developed a pilot professional development system, the Strategic Teaching Framework (STF), that utilizes a computer and CD-ROM and video laserdisc technology to build teachers' knowledge and skills related to three attributes of teaching: use of problem-solving tasks as a central component of instruction, use of collaborative groups as a strategy for carrying out the problem-solving process, and attention to students' thinking processes, including how they represent problems and solutions (NCREL, 1993). Emphasis is on teachers visiting recorded examples of classroom lessons that apply these aspects of instruction.

The STF includes a CD-ROM disc with data regarding classrooms in the modules, video laserdiscs with classroom footage related to each of the three aspects of teaching, a library of literature and support materials that is packaged in separate notebooks, a guide for each of three modules describing the contents of the module, and a separate booklet for each classroom on the laserdiscs providing information about the school, students, teacher, the lesson, and when in the school year the lesson took place. Laserdisc technology was selected for presentation of the examples to facilitate ease of movement within the examples based on teachers' interests and questions. The system can be used by an individual teacher, or by a small group of teachers using a large monitor screen.

In pilot testing this product, SWRL found that teachers required practice in moving about the system; for example, working with the computer program components that provided access

to the various parts of the module, prior to concentrating on the professional development information and instructional examples that were provided. Teachers were enthused about the possibility of having such materials readily available for use at their convenience to obtain new ideas, insights, and skills related to instruction. Indiana University and NCREL staff reported that producing classroom examples on video laserdiscs was very expensive. It required special filming arrangements because videotape recordings were not of high enough resolution to transfer well to the laserdisc format. Costs involved have slowed the completion of system modules.

Inclusion of professional development segments as part of WWW pages on the Internet also has promise. As noted earlier, providing access to professional documents via the WWW is relatively simple. To include instructional examples is more problematic, partly because of the slowness with which they move from the WWW to a user's computer. Use of a series of still photos along with illustrative interactive dialogue or lecture presentations is an alternative approach that has promise because transfer occurs more nearly on a real-time basis.

In addition to demonstrating instructional skills, knowledge, and concepts for the purpose of training other teachers to apply similar expertise, technology—particularly videotape—is used to provide examples of teachers' own instructional expertise. For example, in several BTSA projects, new teachers are required to include videotapes of their use of a range of instructional strategies as part of their professional assessment portfolios. Teachers are requested to teach and record lessons in which they demonstrate their knowledge and skills in areas such as classroom management, developing students' language skills, and engaging students in higher cognitive learning activities. Comparison of these videotapes with tapes of expert teachers teaching similar types of lessons affords beginning teachers opportunities to see ways they can improve their teaching. Over time, examples provide a record of beginning teachers' instructional development. Similar records also are used in experienced teachers' professional portfolios.

Analyzing and Responding to Instructional Situations

Copeland (1989) suggested that in addition to mastery of a set of teaching skills, teachers' ability to perform well in classrooms is dependent upon perceptions, interpretations, and decisions that determine the teaching behaviors they employ. He noted that development of such clinical reasoning can be made more efficient by using simulation techniques. Simulations also may be used to make more accessible and understandable to others the insights and the higher-order planning, analysis, and problem-solving processes used by expert teachers (Sternberg & Horvath, 1995). Application of different ways of thinking about

teaching practices may heighten teachers' awareness of their own beliefs, expand their understanding of the teaching-learning context, and provide content for reflection about teaching and learning (Richardson, 1990).

Technological advancements that link review and interpretation of demonstrations of instruction with decisions regarding next steps in the teaching-learning process and observations of the consequences of these decisions promote insightful thinking and decision-making about the teaching process. Presentation of written case studies or stories of teaching in CD-ROM format with computer programming that facilitates quick movement among multiple data sets on the disc about elements of the story makes it possible to engage teachers in problem-solving experiences that attend to the context, character, contradiction, and complexity of teaching (Carter, 1993). Hypothetically, someone analyzing a case or story could request, and readily obtain, detailed information about the teacher, students, curriculum, school setting, instructional goals and materials, and student outcomes. The story could be told from multiple perspectives (e.g., teacher, student, independent observer). Events could play out in different ways depending upon the facets of the situation to which a teacher-analyst responds. Although much of the data might be in written form, still pictures with voice-over narrative and some video materials also could be included to increase dimensions of a case under consideration. Questions and options could lead the teacher-analyst to consider particular aspects of the case.

Linking laserdisc technology with a computer and an authoring system such as Hypercard expands simulation to include more lengthy video examples of real teaching-learning sequences. Teacher-analysts participating in the simulation might continue an instructional sequence to the end. They also may intervene in ways that alter the teaching-learning sequence, selecting from among several possible actions that respond to circumstances, teacher and/or student interactions, instructional materials, or student performance. Consequences of various interventions might be viewed. Adding CD-ROM capability to the technology, professional articles and research reports related to key aspects of the case or story could be accessed.

Although such professional development experiences have considerable appeal, producing them is very demanding. Copeland (1989) stressed the importance of basing the simulation on descriptive research on teaching and learning, representing a realistic classroom environment in which teaching actions can be exhibited and their potential links to various student behaviors tested. He suggested that instructional options that are presented should incorporate familiar as well as new routines so users can place varying patterns of teaching and learning within their realm of experience. He underlined the importance of post-simulation debriefings in which teachers discuss how what occurred during a simulation furthered,

hindered, or broadened achievement of intended instructional goals and ways in which the simulation modified their own perceptions of teaching and learning.

The prototype Strategic Teaching Framework (STF) mentioned earlier includes some features of a simulation. Participating teachers may opt to run a lesson continuously to the end, obtaining general impressions or insights about instruction. Or they may select particular aspects of teaching, such as classroom management and discipline, and view only segments of the lesson in which key teacher-student interactions occur with relation to that aspect of teaching, and hear teacher and researcher comments related to these segments. It does not allow participating teachers to select among several possible actions at various points in the lesson and to observe differences in ensuing events based on these actions. Teachers also cannot choose to obtain added information about whatever aspect of an instructional sequence may interest them at the point when it occurs in a lesson or a specific feature of the classroom environment as it appears on the screen.

SWRL's pilot test of STF learned that expert, experienced teachers who observed STF lessons considered more important the ability to pursue information about specific teacher or student actions or classroom features as they were observed rather than selecting alternative teacher responses during the lesson, although both were seen as important. On the other hand, beginning teachers felt that posing questions pointing out strengths and weaknesses in the instructional process as the lesson proceeded, offering options that might improve the instructional situation, and showing what occurred following such action were very important.

Much more extensive development and use of simulations are required to measure the full value of such teacher professional development experiences. In the meantime, continued inclusion of analytic activities in the many professional development efforts that engage teachers in viewing videotaped demonstrations of instructional sequences will help build teachers' clinical reasoning. Given the ease of movement from one segment of a lesson to another, expanded use of laser video discs as the vehicle for presenting instructional examples can facilitate analysis of particular features of a lesson alone or in relation to other parts of the lesson. Linking these laserdisc and CD-ROM technology to computer programs that bring demonstrations of teaching together with teacher and researcher commentaries, related professional documents, and instructional lessons and materials can broaden the scope of teacher development experiences and, hopefully, in turn, the factors teachers take into consideration as they teach. This is particularly important when a teacher is working with a group of students from diverse language and cultural backgrounds, some of whom are learning English as a new language.

Teacher Workstation Design

As noted at the beginning of this report, incorporating the technological approaches outlined above in a teacher workstation that provides professional development opportunities related to effective instruction of culturally and linguistically diverse student populations has considerable promise for improving and expanding teacher expertise. Even without production of new training packages requiring use of multiple technological tools, the workstation can encourage teachers to obtain new knowledge, skills, and understandings related to instruction of students among whom several cultures and primary languages are represented. The workstation can make a wide range of already extant professional documents and materials readily available to teachers. It can facilitate discourse among teachers, researchers, and others about instructional strategies that promote successful participation on the part of all students, including LEP students.

Foci of Initial Workstation Professional Development Components

Review of California requirements for certification to teach such diverse student populations provide guidance for the content on which initial workstation components might focus. At present, teachers in California may attain such certification via three paths. Individuals engaged in preservice teacher training programs may pursue a university teacher training program that covers the content and skills required to qualify for a multiple or single subject credential with cross-cultural, language, and academic development emphasis (CLAD credential) or add knowledge about and fluency in a language other than English to the requirements for the CLAD, which qualifies them for a BCLAD credential. Experienced teachers may obtain CLAD/BCLAD credentials by engaging in training offered by universities or other qualified agencies such as California's county offices of education that covers prescribed knowledge and skills.

After completing required training, both preservice and experienced teachers must pass six examinations focused on knowledge and skills related to effective instruction of student groups among whom several languages and cultural backgrounds are represented. Table 1 outlines the foci of three of the six areas on which the examinations focus.

Table 1
Certification Requirements for Multiple and Single Subject Teaching Credentials With Cross-Cultural, Language, and Academic Development Emphasis/Bilingual, Cross-Cultural, Language, and Academic Development Emphasis

Requirement	Issues
Requirement 1: Language structure and first- and second- language development	• Theories and factors in first- and second-language development - Human learning and second-language acquisition - Identification of students' preferred learning modes or styles • Universals and differences in language structure and use - Principles of language(s) structure - Differences and similarities between English and other languages • Structure and use of English language
Requirement 2: Methodology of bilingual, English language development and content instruction	• Theories and methods of bilingual instruction needed by all teachers of LEP students - Principles of second-language learning - Teaching a second language • Instruction for English language development (English as a second language [ESL]) - Teaching oral, written, and nonverbal communication in English • Specially designed content instruction delivered in English (sheltered English) - Subject specific knowledge and strategies that ensure students have equal access to the curriculum - Effective generic teaching practices as they are used among students of diverse backgrounds - Adaptation of curriculum, materials, and technology for LEP students
Requirement 3: Culture and cultural diversity	• Nature of culture • Aspects of cultures that teachers should learn about their students - Diversity of education systems - Understanding of "deficit" and "enrichment" models of language and culture

table continues

Requirement	Issues
	- Historical and contemporary status of linguistic and cultural groups with emphasis on their contributions to the subjects to be taught • Ways to learn about students' cultures - Manifestations of culture • Ways teachers can use cultural knowledge - Cross-cultural knowledge and multicultural competencies to interact effectively with children and adults from linguistically and culturally diverse groups • Cultural contact • Cultural diversity in California and the United States - Social, psychological, cultural, and economic factors that affect first- and second-language development and use

Completion of prescribed training and passing written examinations in these three areas qualifies teachers for the CLAD credential. Teachers with this credential can provide to any LEP student instruction for English language development (e.g., English as a second language [ESL] instruction), and/or specially designed academic instruction in English at the grade levels authorized by the multiple or single subjects of their credentials (e.g. sheltered English instruction). Teachers with this credential are expected to be knowledgeable about language structure and first- and second-language development. They should know about and be able to apply the methodology of bilingual, English language development, and specially designed content instruction. They should have an understanding of culture and cultural diversity and be able to apply this knowledge to enhance instruction in their classrooms.

Table 2 outlines the additional three areas in which preservice and experienced teachers must pass examinations to obtain a BCLAD credential. This credential authorizes them to do the same things as teachers with the CLAD credential and, in addition, to provide instruction to LEP students whose primary language is the teacher's language of emphasis in the three examinations for the students' primary language development and to teach academic content instruction in the language of emphasis. Additional knowledge and skill areas to be demonstrated include methodology for primary language instruction, knowledge about the culture of the teacher's language of emphasis, and the teacher's skill in use of the language of emphasis (a language other than English).

Table 2
Additional Certification Requirements for Multiple and Single Subject Teaching Credentials With Bilingual, Cross-Cultural, Language, and Academic Development Emphasis

Requirement	Issues
Requirement 4: Methodology for primary language instruction	• Characteristics of bilingual programs - Similarities and differences between English and language of emphasis • Instructional delivery in bilingual classrooms - Teaching oral, written, and nonverbal communication in the language of emphasis • Factors to consider in selection and use of primary language materials
Requirement 5: The culture of emphasis	• Origins and characteristics of the culture of emphasis • Major historical periods and events in culture of emphasis • Demography, migration, and immigration of culture of emphasis • Contribution of the culture of emphasis in California and the United States
Requirement 6: Language of emphasis	• Teacher's proficiency in language of emphasis in: - Listening - Reading - Speaking - Writing

In addition to the above credentials, by completing 45 hours of staff development related to English language development or specially designed academic instruction in English, teachers with nine or more years experience in California's public schools can qualify to teach English language learners in self-contained classrooms—for example, teach students among whom multiple cultures and languages may be represented, some of whom may be LEP. Hence, the common area of emphasis across all three certification areas is use of English language development and sheltered English instructional approaches.

Interestingly, the Bilingual Trainers of Teachers Program (BTTP) in California responsible for designing and conducting training to assist experienced teachers in gaining the knowledge and skills necessary to pass the CLAD/BCLAD examinations have not opted to

begin with the English language development/sheltered English requirement. This may be because bilingual education coordinators in many county offices of education in California have developed training workshops that build experienced teachers' knowledge and skill related to use of English language development and sheltered English instructional strategies, and current information regarding the cultures and primary languages of students enrolled in the schools in their areas. Most of these workshop packages include videotaped examples of teachers' use of the strategies in regular classrooms, printed materials discussing the theoretical bases of the strategies, and materials teachers can use to adapt their instruction to better meet the needs of LEP students. Although they may not focus precisely on CLAD/BCLAD credential requirements, these training packages offer an important resource for improving the educational opportunities afforded diverse student populations in California and other states.

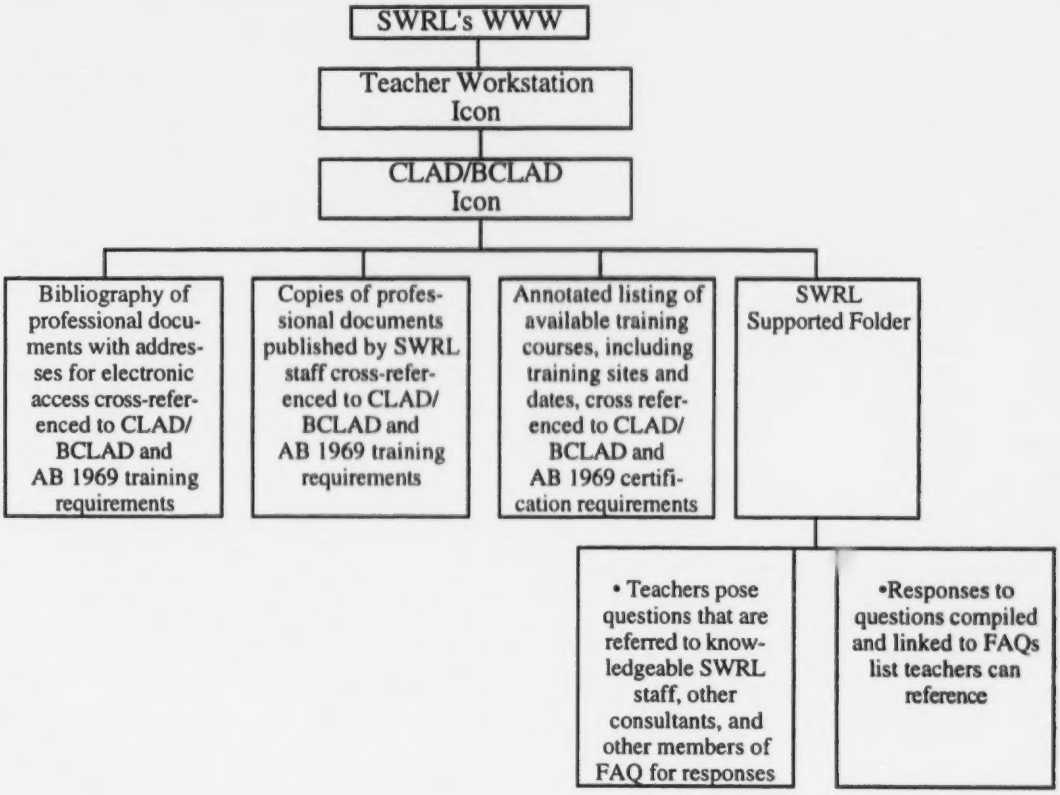
To date, the regional BTTP centers have concentrated on credential Requirements 4, 5, and 6 as related to Spanish as the primary language of emphasis, and dealing with Requirement 3 from a multicultural perspective. Their efforts center around development of workshop outlines, support materials, and practice quizzes that prepare teachers to pass the examinations in these areas. BBTP staff train county and school district teacher trainers to conduct the workshops for teachers in their areas.

Thus, it appears that a teacher workstation can contribute in several ways to provision of suitable learning methods and environment required for culturally and linguistically diverse students to most effectively develop English language proficiency, succeed in academic content areas, allow for a smooth transition to the new cultural environment, and create a safer, more conformable environment for home and school interactions. Initially, the workstation can increase teachers' access to information and professional development opportunities that already exist. As a next step, work on the station might adapt already extant materials to make them available through electronic information systems. Later, multimedia training packages might be developed with an emphasis on building analytic and clinical reasoning skills that expert teachers of diverse student groups apply as they adjust instruction to better meet the needs of their students.

Teacher Workstation as a Feature on SWRL's WWW

Currently, it is possible to provide considerable relevant information for teachers concerning CLAD/BCLAD certification by adding a Teacher Workstation option on SWRL's current WWW Page. How this can be accomplished is represented by Figure 1.

Figure 1
Placing Teacher Workstation as Option on SWRL's WWW


SWRL's WWW
Teacher Workstation Icon
CLAD/BCLAD Icon
Bibliography of professional documents with addresses for electronic access cross-referenced to CLAD/ BCLAD and AB 1969 training requirements
Copies of professional documents published by SWRL staff cross-referenced to CLAD/ BCLAD and AB 1969 training requirements
Annotated listing of available training courses, including training sites and dates, cross referenced to CLAD/ BCLAD and AB 1969 certification requirements
SWRL Supported Folder
• Teachers pose questions that are referred to knowledgeable SWRL staff, other consultants, and other members of FAQ for responses
•Responses to questions compiled and linked to FAQs list teachers can reference

Alongside other programs on the SWRL WWW menu would appear an icon representing the Teacher Workstation. Clicking on this icon would send the user to the Teacher Workstation Main Menu. An icon would appear on the Teacher Workstation menu for CLAD/BCLAD credential information, and clicking on this icon would send the user to the CLAD/BCLAD menu.

The CLAD/BCLAD database currently consists of three data sets and a folder where users can posit questions and review Frequently Asked Questions (FAQs) by previous users.

The first data set consists of professional documents with addresses for electronic access cross-referenced to CLAD/BCLAD and AB 1969 training requirements. For example, several ERIC clearinghouses contain research and practitioner documents relating to teaching ESL. These and other sources can be included in this data set, referenced by training requirements. A user who wanted access to this information would be provided with immediate linkage to a specific ERIC clearinghouse collection.

The second data set would house SWRL documents related to CLAD/BCLAD and AB 1969 training requirements. Users would be able to scan this reference list and download any documents they wished.

The third data set would be a listing of available training courses and training sites currently providing CLAD/BCLAD and AB 1969 training. In the case a given source is electronically linked to the Internet, immediate electronic access to their database can be provided. Others would have addresses and telephone numbers so they could be contacted by users for more information.

In addition to these three data sets, a folder could be provided allowing users to leave questions to be answered by SWRL staff, or to scan FAQs previously left by other users. FAQs would include responses by SWRL staff to each question. A procedure would be established encouraging users to scan the FAQ database first before asking a question. For each question asked, SWRL staff would provide answers and e-mail them back to users within a reasonable period of time. In the event a user is asking a question already answered in the FAQs database, the SWRL administrator monitoring this activity would copy the answer from the FAQ database and e-mail it to the user along with a recommendation to make use of the FAQ database the next time a question comes up.

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